WHAT IS CLAIMED IS:

1   1. A program development apparatus used for developing a
2   program to be installed in a system having at least a first central
3   processing and an other component, said program development
4   apparatus comprising:
5   a program generating section for generating said program and
6   an event pseudo-generating routine for pseudo-generating said
7   event based on a state-transition matrix and event pseudo-
8   generating information for pseudo-generating a same event as an
9   event which normally occurs based on data or a signal transmitted
10   from said other component to said first central processing unit
11   in said system, wherein said state-transition matrix has a
12   plurality of cells, each of said cells defined by a state in which
13   said system to be a subject of a program development is enabled
14   to be and an event which is an impulse from an outside or an inside
15   of said system and further wherein a content of a process to be
16   executed by said system and a state of a transition destination
17   to be transited when a corresponding event occurs under a
18   corresponding state are described in each said cell;
19   a second central processing unit having a same function as
20   said first central processing unit and for executing emulation
21   of said program and said event pseudo-generating routine; and
22   an analysis section for starting said emulation of said
23   program from a state input as an initial state and for referring
24   to said pseudo-generating information and rewriting information
25   for pseudo-generating said event memorized in a memory section
26   used in executing said event pseudo-generating routine into
27   information corresponding to said event which is instructed to
28   occur.

1　　　　1. A program development apparatus used for developing a

2　　program to be installed in a system having at least a first central

3　　processing and an other component, said program development

4　　apparatus comprising:

5　　　　　a state-transition matrix memory section for memorizing a

6　　state-transition matrix, wherein said state-transition matrix

7　　has a plurality of cells, each of said cells defined by a state

8　　in which said system to be a subject of a program development is

9　　enabled to be and an event which is an impulse from an outside

10　　or an inside of said system and further wherein a content of a

11　　process to be executed by said system and a state of a transition

12　　destination to be transited when a corresponding event occurs

13　　under a corresponding state are described in each said cell;

14　　　　　an event pseudo-generating editor for generating event

15　　pseudo-generating information for pseudo-generating a same event

16　　as an event which normally occurs based on data or a signal

17　　transmitted from said other component to a first central

18　　processing unit in said system;

19　　　　　a program generating section for generating said program and

20　　an event pseudo-generating routine for pseudo-generating said

21　　event;

22　　　　　a second central processing unit for having a same function

23　　as said first central processing unit and for executing emulation

24　　of said program and said event pseudo-generating routine;

25　　　　　an input section for detecting which display position of each

26　　event or each state is indicated among a plurality of events and

27　　a plurality of states forming said state-transition matrix

28　　displayed on a display section and for outputting position

29　　information of said display position; and

30　　　　　an analysis section for converting said position information

31 into an event code or a state code corresponding to said position
32 so as to set a state corresponding to said state code as an initial
33 state for starting emulation of said program and for referring
34 to said pseudo-generating information so as to rewrite
35 information memorized in a memory section used in executing said
36 pseudo-generating routine, said information for pseudo-
37 generating an event into information corresponding to said event
38 code.

1 3. A program development apparatus used for developing a
2 program to be installed in a system having at least a first central
3 processing and an other component, said program development
4 apparatus comprising:
5 a state-transition matrix memory section for memorizing a
6 state-transition matrix, wherein said state-transition matrix
7 has a plurality of cells, each of said cells defined by a state
8 in which said system to be a subject of a program development is
9 enabled to be and an event which is an impulse from an outside
10 or an inside of said system and further wherein a content of a
11 process to be executed by said system and a state of a transition
12 destination to be transited when a corresponding event occurs
13 under a corresponding state are described in each said cell;
14 an event pseudo-generating editor for generating event
15 pseudo-generating information for pseudo-generating a same event
16 as an event which normally occurs based on data or a signal
17 transmitted from said other component to a first central
18 processing unit in said system;
19 a program generating section for generating said program and
20 an event pseudo-generating routine for pseudo-generating said
21 event;

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22   a second central processing unit for having a same function

23 as said first central processing unit and for executing emulation

24 of said program and said event pseudo-generating routine;

25   an input section for detecting which display position of each

26 event or each state is indicated among a plurality of events and

27 a plurality of states forming said state-transition matrix

28 displayed on a display section so as to output position

29 information of said display position and for generating an input

30 event log including an order of instructed events and an

31 instruction timing of each event; and

32   a script generating section for generating a script file in

33 which an occurrence timing of each event and a timing at which

34 an element in said system operates in accordance with a

35 specification are descried based on said input event log;

36   a script analysis section for sequentially outputting

37 position information of each event described in said script file

38 and of a corresponding display area in said state-transition

39 matrix displayed on said display section in order and at an

40 occurrence timing described in said script file; and

41   an analysis section for converting said position information

42 into an event code or a state code corresponding to said position

43 so as to set a state corresponding to said state code as an initial

44 state for starting emulation of said program and for referring

45 to said pseudo-generating information so as to rewrite

46 information memorized in a memory section used in executing said

47 pseudo- generating routine, said information for pseudo-

48 generating an event into information corresponding to said event

49 code.

1   4. The program development apparatus according to Claim 3

2 further comprising:

3 　　a script editor for editing said script file based on any

4 one of an event input to be occurred, an occurrence timing of said

5 event and an occurrence frequency.

1 　　5. The program development apparatus according to Claim 3,

2 wherein said script file is any one of a timing chart format, a

3 text format and a message sequence chart format.

1 　　6. The program development apparatus according to Claim 1,

2 wherein said program includes a main routine for executing a main

3 process of said system and a normal generating event routine for

4 normally generating a corresponding event based on various data

5 and a signal transmitted from said other component to said first

6 central processing unit.

1 　　7. The program development apparatus according to Claim 2,

2 wherein said program includes a main routine for executing a main

3 process of said system and a normal generating event routine for

4 normally generating a corresponding event based on various data

5 and a signal transmitted from said other component to said first

6 central processing unit.

1 　　8. The program development apparatus according to Claim

2 3, wherein said program includes a main routine for executing

3 a main process of said system and a normal generating event routine

4 for normally generating a corresponding event based on various

5 data and a signal transmitted from said other component to said

6 first central processing unit.

1　　　　9.　The program development apparatus according to Claim 1,

2　wherein said event pseudo-generating information is information

3　of a generating technique in accordance with said event.

1　　　　10.　The program development apparatus according to Claim

2　2, wherein said event pseudo-generating information is

3　information of a generating technique in accordance with said

4　event.

1　　　　11.　The program development apparatus according to Claim

2　3, wherein said event pseudo-generating information is

3　information of a generating technique in accordance with said

4　event.

1　　　　12.　The program development apparatus according to Claim

2　1, wherein said event is any one of a message-type for receiving

3　a start message from another task or another apparatus, a

4　flag-type for reading a variation of a variable or an input/output,

5　an interrupt-type for receiving an interrupt from an outside, an

6　in-mail type for notifying an internal event which occurs in a

7　cell of said state-transition matrix to another state-transition

8　matrix when said state-transition matrix is layered and a

9　function-call type for calling a function executing a group of

10　processes.

1　　　　13.　The program development apparatus according to Claim

2　2, wherein said event is any one of a message-type for receiving

3　a start message from another task or another apparatus, a

4　flag-type for reading a variation of a variable or an input/output,

5　an interrupt-type for receiving an interrupt from an outside, an

8　matrix when said state-transition matrix is layered and a
9　function-call type for calling a function executing a group of
10　processes.

1　　　14. The program development apparatus according to Claim
2　3, wherein said event is any one of a message-type for receiving
3　a start message from another task or another apparatus, a
4　flag-type for reading a variation of a variable or an input/output,
5　an interrupt-type for receiving an interrupt from an outside, an
6　in-mail type for notifying an internal event which occurs in a
7　cell of said state-transition matrix to another state-transition
8　matrix when said state-transition matrix is layered and a
9　function-call type for calling a function executing a group of
10　processes.

1　　　15. A program development method used for developing a
2　program to be installed in a system having at least a first central
3　processing and an other component, said program development
4　method comprising:
5　　　a first step of generating said program and an event
6　pseudo-generating routine for pseudo-generating said event based
7　on a state-transition matrix and event pseudo -generating
8　information for pseudo-generating a same event as an event which
9　normally occurs based on data or a signal transmitted from said
10　other component to said first central processing unit in said
11　system, wherein said state-transition matrix has a plurality of
12　cells, each of said cells defined by a state in which said system
13　to be a subject of a program development is enabled to be and an
14　event which is an impulse from an outside or an inside of said
15　system and further wherein a content of a process to be executed

16　by said system and a state of a transition destination to be

17　transited when a corresponding event occurs under a corresponding

18　state are described in each said cell; and

19　　　a second step of starting emulation of said program from a

20　state input as an initial state, of referring to said pseudo-

21　generating information while executing said event pseudo-

22　generating routine and of rewriting information for pseudo-

23　generating said event memorized in a memory section used in

24　executing said event pseudo-generating routine into information

25　corresponding to said event which is instructed to occur.

1　　　16. A program development method used for developing a

2　program to be installed in a system having at least a first central

3　processing and an other component, and carried out by using:

4　　　a state-transition matrix memory section for memorizing a

5　state-transition matrix, wherein said state-transition matrix

6　has a plurality of cells, each of said cells defined by a state

7　in which said system to be a subject of a program development is

8　enabled to be and an event which is an impulse from an outside

9　or an inside of said system and further wherein a content of a

10　process to be executed by said system and a state of a transition

11　destination to be transited when a corresponding event occurs

12　under a corresponding state are described in each said cell;

13　　　an input section for detecting a display position of which

14　event or state is instructed among a plurality of events or a

15　plurality of states forming said state-transition matrix

16　displayed on a display section and for outputting position

17　information about detected said display position, said program

18　development method comprising:

19　　　a first step of generating event pseudo-generating

20　information for pseudo-generating a same event as an event

21　normally generated based on data or a signal transmitted from said

22　other component to a first central processing unit in said system;

23　　　　a second step of generating said program and an event

24　pseudo-generating routine for pseudo-generating said event based

25　on said state-transition matrix and said event pseudo-generating

26　information; and

27　　　　a third step of converting said position information into

28　an event code or a state code corresponding to said position, of

29　starting emulation of said program from a state input as an initial

30　state, of referring to said pseudo-generating information while

31　executing said event pseudo-generating routine and of rewriting

32　information for pseudo-generating said event memorized in a

33　memory section used in executing said event pseudo-generating

34　routine into information corresponding to said event which is

35　instructed to occur.

1　17. A program development method used for developing a

2　program to be installed in a system having at least a first central

3　processing and an other component, and carried out by using:

4　　　　a state-transition matrix memory section for memorizing a

5　state-transition matrix, wherein said state-transition matrix

6　has a plurality of cells, each of said cells defined by a state

7　in which said system to be a subject of a program development is

8　enabled to be and an event which is an impulse from an outside

9　or an inside of said system and further wherein a content of a

10　process to be executed by said system and a state of a transition

11　destination to be transited when a corresponding event occurs

12　under a corresponding state are described in each said cell;

13　　　　an input section for detecting a display position of which

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14 event or state is instructed among a plurality of events or a

15 plurality of states forming said state-transition matrix

16 displayed on a display section and for outputting position

17 information about detected said display position, said program

18 development method comprising:

19   a first step of generating event pseudo-generating

20 information for pseudo-generating a same event as an event

21 normally generated based on data or a signal transmitted from said

22 other component to a first central processing unit in said system;

23   a second step of generating said program and an event

24 pseudo-generating routine for pseudo-generating said event based

25 on said state-transition matrix and said event pseudo-generating

26 information;

27   a third step of generating an input event log including an

28 order of instructed events and a timing at which each event is

29 instructed;

30   a fourth step, based on said input event log, of generating

31 a script file in which an occurrence timing of each event described

32 in said state-transition matrix and a timing at which an element

33 in said system operates in accordance with a specification are

34 described;

35   a fifth step of sequentially outputting position information

36 of each event described in said script file and of a corresponding

37 display area in said state-transition matrix displayed on said

38 display section in order and at an occurrence timing described

39 in said script file; and

40   a sixth step of converting said position information into

41 an event code corresponding to said position, of referring to said

42 event pseudo-generating information while executing said event

43 pseudo-generating routine and of rewriting information memorized

44　in a memory section used by said event pseudo-generating routine,

45　said information for pseudo-generating an event into information

46　corresponding to said event code.

1　　18.　The program development method according to Claim 17,

2　further comprising:

3　　　　a seventh step of editing said script file based on any one

4　of an event input to be occurred, an occurrence timing of said

5　event and an occurrence frequency.

1　　19.　The program development method according to Claim 17,

2　wherein said script file is any one of a timing chart format, a

3　text format and a message sequence chart format.

1　　20.　The program development method according to Claim 15

2　wherein said program includes a main routine for executing a main

3　process of said system and a normal generating event routine for

4　normally generating a corresponding event based on various data

5　and a signal transmitted from said other component to said first

6　central processing unit.

1　　21.　The program development method according to Claim 16

2　wherein said program includes a main routine for executing a main

3　process of said system and a normal generating event routine for

4　normally generating a corresponding event based on various data

5　and a signal transmitted from said other component to said first

6　central processing unit.

1　　22.　The program development method according to Claim 17

2　wherein said program includes a main routine for executing a main

3　process of said system and a normal generating event routine for

4　normally generating a corresponding event based on various data

5　and a signal transmitted from said other component to said first

6　central processing unit.

1　　　23.　The program development method according to Claim 15,

2　wherein said event pseudo-generating information is information

3　of a generating technique in accordance with said event.

1　　　24.　The program development method according to Claim 16,

2　wherein said event pseudo-generating information is information

3　of a generating technique in accordance with said event.

1　　　25.　The program development method according to Claim 17,

2　wherein said event pseudo-generating information is information

3　of a generating technique in accordance with said event.

1　　　26.　The program development method according to Claim 15,

2　wherein said event is any one of a message-type for receiving a

3　start message from another task or another apparatus, a flag-

4　type for reading a variation of a variable or an input/output,

5　an interrupt-type for receiving an interrupt from an outside, an

6　in-mail type for notifying an internal event which occurs in a

7　cell of said state-transition matrix to another state-transition

8　matrix　when　said　state-transition　matrix　is　layered　and　a

9　function-call type for calling a function executing a group of

10　processes.

1　　　27.　The program development method according to Claim 16,

2　wherein said event is any one of a message-type for receiving a

3　start message from another task or another apparatus, a flag-

4　type for reading a variation of a variable or an input/output,

5　an interrupt-type for receiving an interrupt from an outside, an

6　in-mail type for notifying an internal event which occurs in a

7　cell of said state-transition matrix to another state-transition

8　matrix when said state-transition matrix is layered and a

9　function-call type for calling a function executing a group of

10　processes.

1　　　28.　The program development method according to Claim 17,

2　wherein said event is any one of a message-type for receiving a

3　start message from another task or another apparatus, a flag-

4　type for reading a variation of a variable or an input/output,

5　an interrupt-type for receiving an interrupt from an outside, an

6　in-mail type for notifying an internal event which occurs in a

7　cell of said state-transition matrix to another state-transition

8　matrix when said state-transition matrix is layered and a

9　function-call type for calling a function executing a group of

10　processes.

1　　　29.　A program development program for causing a computer

2　to carry out a program development method used for developing a

3　program to be installed in a system having at least a first central

4　processing and an other component, said program development

5　method comprising:

6　　　a first step of generating said program and an event

7　pseudo-generating routine for pseudo-generating said event based

8　on a state-transition matrix and event pseudo -generating

9　information for pseudo-generating a same event as an event which

10　normally occurs based on data or a signal transmitted from said

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11 other component to said first central processing unit in said

12 system, wherein said state-transition matrix has a plurality of

13 cells, each of said cells defined by a state in which said system

14 to be a subject of a program development is enabled to be and an

15 event which is an impulse from an outside or an inside of said

16 system and further wherein a content of a process to be executed

17 by said system and a state of a transition destination to be

18 transited when a corresponding event occurs under a corresponding

19 state are described in each said cell; and

20   a second step of starting emulation of said program from a

21 state input as an initial state, of referring to said pseudo-

22 generating information while executing said event pseudo-

23 generating routine and of rewriting information for pseudo-

24 generating said event memorized in a memory section used in

25 executing said event pseudo-generating routine into information

26 corresponding to said event which is instructed to occur.

1   30. A storage medium storing a program development program

2 for causing a computer to carry out a program development method

3 used for developing a program to be installed in a system having

4 at least a first central processing and an other component, said

5 program development method comprising:

6   a first step of generating said program and an event

7 pseudo-generating routine for pseudo-generating said event based

8 on a state-transition matrix and event pseudo -generating

9 information for pseudo-generating a same event as an event which

10 normally occurs based on data or a signal transmitted from said

11 other component to said first central processing unit in said

12 system, wherein said state-transition matrix has a plurality of

13 cells, each of said cells defined by a state in which said system

14　to be a subject of a program development is enabled to be and an

15　event which is an impulse from an outside or an inside of said

16　system and further wherein a content of a process to be executed

17　by said system and a state of a transition destination to be

18　transited when a corresponding event occurs under a corresponding

19　state are described in each said cell; and

20　　　　a second step of starting emulation of said program from a

21　state input as an initial state, of referring to said pseudo-

22　generating information while executing said event pseudo-

23　generating routine and of rewriting information for pseudo-

24　generating said event memorized in a memory section used in

25　executing said event pseudo-generating routine into information

26　corresponding to said event which is instructed to occur.

1　　　3⅄. A program development program for causing a computer

2　to carry out a program development program for causing a computer

3　to carry out A program development method used for developing a

4　program to be installed in a system having at least a first central

5　processing and an other component, said program development

6　method comprising:

7　　　　a state-transition matrix memory section for memorizing a

8　state-transition matrix, wherein said state-transition matrix

9　has a plurality of cells, each of said cells defined by a state

10　in which said system to be a subject of a program development is

11　enabled to be and an event which is an impulse from an outside

12　or an inside of said system and further wherein a content of a

13　process to be executed by said system and a state of a transition

14　destination to be transited when a corresponding event occurs

15　under a corresponding state are described in each said cell;

16　　　　an input section for detecting a display position of which

17　event or state is instructed among a plurality of events or a

18　plurality of states forming said state-transition matrix

19　displayed on a display section and for outputting position

20　information about detected said display position;

21　　　a first step of generating event pseudo-generating

22　information for pseudo-generating a same event as an event

23　normally generated based on data or a signal transmitted from said

24　other component to a first central processing unit in said system;

25　　　a second step of generating said program and an event

26　pseudo-generating routine for pseudo-generating said event based

27　on said state-transition matrix and said event pseudo-generating

28　information; and

29　　　a third step of converting said position information into

30　an event code or a state code corresponding to said position, of

31　starting emulation of said program from a state input as an initial

32　state, of referring to said pseudo-generating information while

33　executing said event pseudo-generating routine and of rewriting

34　information for pseudo-generating said event memorized in a

35　memory section used in executing said event pseudo-generating

36　routine into information corresponding to said event which is

37　instructed to occur.